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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,259	03/31/2004	Mukul P. Renavikar	42P19022	9845

8791 7590 08/21/2006

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EXAMINER

LE, DUNG ANH

ART UNIT PAPER NUMBER

2818

DATE MAILED: 08/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/816,259

Applicant(s)

RENAVIKAR ET AL.

Examiner

DUNG A. LE

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 29-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 13-14, 29-35 and 37 is/are rejected.
- 7) ☒ Claim(s) 11, 12 and 36 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 5/15/2006.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

DETAILED ACTION

**Response to Amendment dated 6/27/2006**

Claims 1,6-8,29,33-34 are amended.

Claims 1-14 and 39-37 are remained in this application.

**Information Disclosure Statement**

This office acknowledges of the following items from the Applicant:

Information Disclosure Statement (IDS) filed on 5/15/06 has/have been considered and made of record. The references cited on the PTOL 1449 form have been considered.

**Claim Rejections**

**Set of claims 1-14**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 1- 6 and 10- 13 are rejected under 35 USC 102 (e) as being anticipated by Gudesen et al. (6878980).**

Gudesen et al. teach an apparatus (figs: 3-4 and related texts) comprising:

- a first metal electrode layer 1b;
- a metal nitride layer 3b (col. 4 , lines 30-35; col. 12, lines 65-67 and col 13, lines 1- 20) adjacent to the first metal electrode layer wherein the metal nitride layer comprises an excess of holes in the metal nitride layer (col. 5 , lines 65-67; col. 6, lines 1-12) ;
- a polymer ferroelectric layer 2 adjacent to the metal nitride layer;
- a metal oxide 3a (col. 5, lines 25- 30; col. 12, lines 55- 60) layer adjacent to the polymer ferroelectric layer; and a second metal electrode layer 1a adjacent to the metal oxide layer.

**Regarding claim 2**, wherein the first metal electrode layer and second metal electrode layer are tantalum (col. 11, lines 35-40).

**Regarding claim 3**, the polymer ferroelectric layer 2 is polyvinylidene fluoride (col. 4 , lines 45-50).

**Regarding claim 4**, wherein the polymer ferroelectric layer 2 is a polyvinylidene fluoride trifluoroethylene copolymer (col. 4 , lines 45-50).

**Regarding claim 5**, the metal nitride layer is tantalum nitride 3b (col. 4 , lines 30-35).

**Regarding claim 6**, wherein the tantalum nitride is doped with hafnium to create the excess of holes in the tantalum nitride layer (col 5, lines 65-67; col. 6, lines 1-12 and col. 13 , lines 5-10).

**Regarding claim 8**, wherein the tantalum nitride is deposited in the presence of excess nitrogen to create the excess of holes in the tantalum nitride layer (col. 13, lines 1-10) .

**Regarding claim 10**, the metal oxide layer is tantalum oxide (col. 4 , lines 24-30).

**Regarding claim 13**, wherein the tantalum oxide layer is deposited in the presence of excess oxygen (col. 4, lines 24-30 and col. 12 , lines 54-57) to create excess holes in the tantalum oxide lattice.

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 7, 9, 14 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Gudesen et al. in view of the following remark.**

Gudesen et al. teaches the claimed invention as applied to claims 1, 5- 6 except for wherein the tantalum nitride has a hole density of approximately between  $10^{20} / \text{cm}^3$  and  $10^{21} / \text{cm}^3$  ; Gudesen et al. teaches the claimed invention as applied to claims 1, 5, 8 except for wherein the tantalum nitride has a hole density of approximately between  $1.8 \times 10^{21} / \text{cm}^3$  and  $5.4 \times 10^{21} / \text{cm}^3$  and Gudesen et al. also teaches the claimed invention as applied to claims 1, 10 and 13 except for wherein the tantalum oxide has a hole density of approximately between  $7 \times 10^{20} / \text{cm}^3$  and  $2.1 \times 10^{21} / \text{cm}^3$  as cited in current claims 7, 9 and 14.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the layer of the tantalum nitride has a hole density of approximately between  $10^{20} / \text{cm}^3$  and  $10^{21} / \text{cm}^3$  ; wherein the layer of tantalum nitride has a hole density of approximately between  $1.8 \times 10^{21} / \text{cm}^3$  and  $5.4 \times 10^{21} / \text{cm}^3$  and wherein the layer of tantalum oxide has a hole density of approximately between  $7 \times 10^{20} / \text{cm}^3$  and  $2.1 \times 10^{21} / \text{cm}^3$  , since it has been held that where the

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general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

**Set of claims 29-37:**

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 29- 35 and 37 are rejected under 35 USC 102 (e) as being anticipated by Gudesen et al. (6878980).**

Gudesen et al. teach an apparatus (figs: 3-4 and related texts) comprising:

a metal nitride layer 4b (col. 4 , lines 30-35; col. 12, lines 65-67 and col 13, lines 1- 20) wherein the metal nitride layer comprises an excess of electron traps in the metal nitride layer (col. 5 , lines 65-67; col. 6, lines 1-12).

a polymer ferroelectric layer 2 adjacent to the metal nitride layer;

a metal oxide layer 4a (col. 5, lines 25- 30; col. 12, lines 55- 60) adjacent to the polymer ferroelectric layer.

**Regarding claim 30**, the polymer ferroelectric layer is polyvinylidene fluoride (col. 4 , lines 45-50).

**Regarding claim 31**, wherein the polymer ferroelectric layer is a polyvinylidene fluoride trifluoroethylene copolymer (col. 4 , lines 45-50).

**Regarding claim 32**, the metal nitride layer is tantalum nitride 4b (col. 4 , lines 30-35).

**Regarding claim 33**, wherein the tantalum nitride is doped with hafnium to create the excess of electron traps in the tantalum nitride layer ((col. 5 , lines 65-67; col. 6, lines 1-12 and col. 13 , lines 5-10).

**Regarding claim 34**, wherein the tantalum nitride is deposited in the presence of excess nitrogen to create the excess of electron traps in the tantalum nitride layer (col. 13, lines 1-10) .

**Regarding claim 35**, the metal oxide layer is tantalum oxide (col. 4 , lines 24-30).



**Regarding claim 37**, wherein the tantalum oxide layer is deposited in the presence of excess oxygen (col. 4, lines 24-30 and col. 12 , lines 54-57) to create excess holes in the tantalum oxide lattice.

***Reasons for Indication of Allowable Subject Matter***

**Claims 11- 12 and 36 are objected** to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations. Gudesen et al. (U.S. Patent No. 6878980) and Background of Invention, taken individually or in combination, do not teach the claimed invention having (Regarding claims 11 and 36) wherein the tantalum oxide layer is doped with hafnium to create the excess holes/ the excess electron traps in the tantalum oxide lattice.

If Applicants are aware of better art than that which has been cited, they are required to call such to attention of the examiner.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is (571) 272-1784. The examiner can normally be reached on Monday-Tuesday and Thursday 6:00am- 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, M. Smith can be reached on (571) 272-1907. The central fax phone numbers for the organization where this application or proceeding is assigned are (571)272-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DUNG A. LE  
Primary Examiner  
Art Unit 2818

